

CLAIMS

What is claimed is:

- 1 1. A method for a controlled release of structures
2 comprising:
3 a) forming one or more trenches in a layer of device
4 material;
5 b) filling the trenches with an etch-stop material;
6 c) defining one or more structures between selected
7 filled trenches; and
8 d) etching one or more portions of the device layer
9 between the filled trenches to release the
10 structures, wherein the etching does not etch the
11 etch-stop material.
- 1 2. The method of claim 1, wherein b) includes depositing
2 etch-stop material over the surface of the device
3 layer.
- 1 3. The method of claim 2 wherein c) includes
2 forming one or more openings in the etch-stop
3 material that has been deposited over the
4 surface of the device layer.
- 1 4. The method of claim 2, wherein the etching
2 undercuts one or more portions of the etch-stop
3 material that has been deposited over the
4 surface of the device layer.
- 1 5. The method of claim 1 where the layer of device
2 material is disposed between two layers of etch-stop
3 material.

1 6. The method of claim 1, wherein the device layer
2 includes one or more layers of a silicon-on-insulator
3 (SOI) substrate.

1 7. The method of claim 1, wherein the device layer is a
2 layer of glass, quartz or oxide.

1 8. The method of claim 1, wherein d) includes a wet etch
2 process.

1 9. The method of claim 1, wherein d) includes a dry etch
2 process.

1 10. The method of claim 1, further comprising: forming a
2 structural layer proximate one or more of the exposed
3 areas of the device layer.

1 11. The method of claim 10, wherein the etch process
2 in d) does not etch the structural layer.

1 12. The method of claim 10, further comprising
2 releasing one or more portions of the structural
3 layer.

1 13. The method of claim 10, wherein the etch process
2 in d) releases one or more portions of the
3 structural layer.

1 14. The method of claim 10, wherein the structural
2 layer includes one or more structures that are
3 formed directly on top of the etch-stop layer.

1 15. The method of claim 14, wherein the structural
2 layer contains two or more sub-layers.

1 16. A process for forming structures comprising:

- 2 i) forming one or more trenches in a layer of device
3 material;
- 4 ii) filling the trenches with an etch-stop material to
5 define one or more structures;
- 6 iii) masking a surface of the layer of device material to
7 expose one or more selected areas of device material
8 that border one or more filled trenches; and
- 9 iv) etching one or more of the selected areas of the
10 device layer to release the structures, wherein the
11 etching does not etch the etch-stop material.

- 1 17. A comb structure comprising
- 2 a) one or more static comb fingers
- 3 b) one or more movable comb fingers that are movable with
4 respect to the static comb fingers; wherein the static
5 comb fingers, the movable comb fingers, or both are
6 formed by:
- 7 i) forming one or more trenches in a layer of device
8 material;
- 9 ii) filling the trenches with an etch-stop material to
10 define one or more structures
- 11 iii) masking a surface of the layer of device material
12 to expose one or more selected areas of device
13 material that border one or more filled trenches;
14 and
- 15 iv) etching one or more of the selected areas of the
16 device layer to release the structures, wherein the
17 etching does not etch the etch-stop material.

- 1 18. The comb structure of Claim 17 wherein both the static
2 comb fingers and the movable comb fingers are formed on
3 the same level.

- 1 19. The comb structure of Claim 17 wherein the movable comb
2 fingers are disposed above the static comb fingers.

- 1 20. A MEMS device, comprising one or more structures, wherein
2 the structures have been formed by:
3 i) forming one or more trenches in a layer of device
4 material;
5 ii) filling the trenches with an etch-stop material to
6 define one or more structures;
7 iii) masking a surface of the layer of device material to
8 expose one or more selected areas of device material
9 that border one or more filled trenches; and
10 iv) etching one or more of the selected areas of the
11 device layer to release the structures, wherein the
12 etching does not etch the etch-stop material.
- 1 21. The MEMS device of claim 20, wherein the structures
2 comprise one or more comb fingers.
- 1 22. The MEMS device of claim 20, wherein the
2 structures include one or more electrostatic
3 actuators.